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Plaehn

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(54) **MOBILE DEVICE FIELD OF VIEW REGION DETERMINATION**

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(52) **U.S. Cl.**
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(58) **Field of Classification Search**
None
See application file for complete search history.

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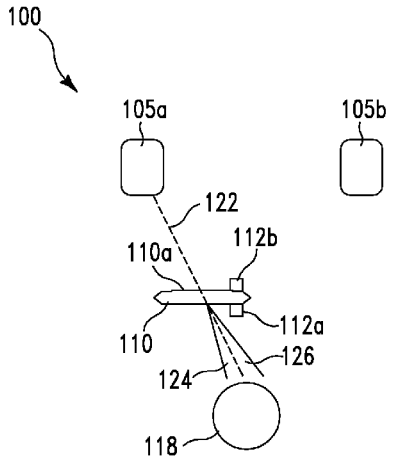
(57) **ABSTRACT**

A method and system for determining a field of view region on a mobile device display is provided. The method includes receiving by a mobile device from a user facing camera of the mobile device, an image of a user currently using the mobile device. Key features of the image are identified and attributes of the key features are determined. The attributes are analyzed and a specified region within a field of view of an object facing camera of the mobile device is determined. Data associated with the specified region is provided for a software application.

20 Claims, 8 Drawing Sheets



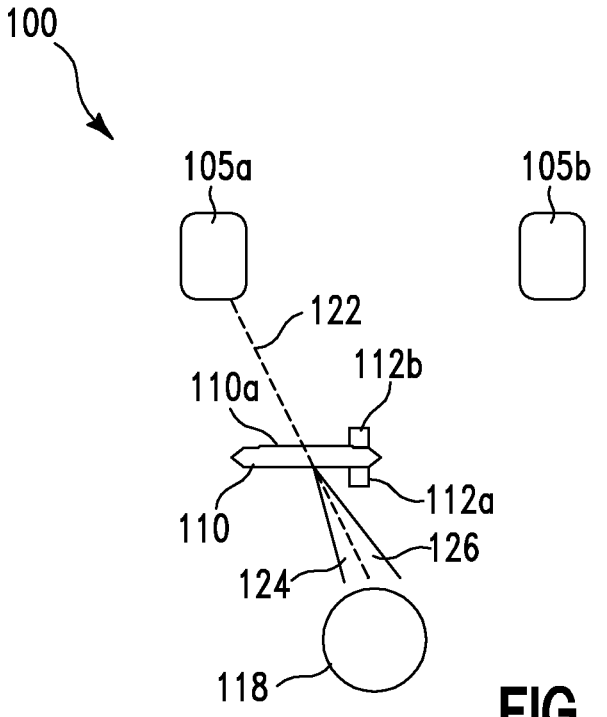

100
105a
105b
122
112b
110a
110
112a
126
124
118

FIG. 1A

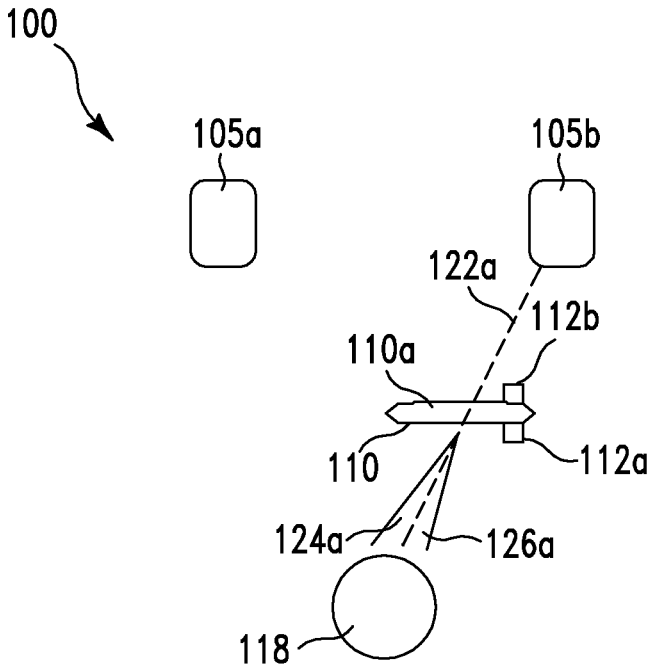

100
105a
105b
122a
112b
110a
110
112a
124a
126a
118

FIG. 1B

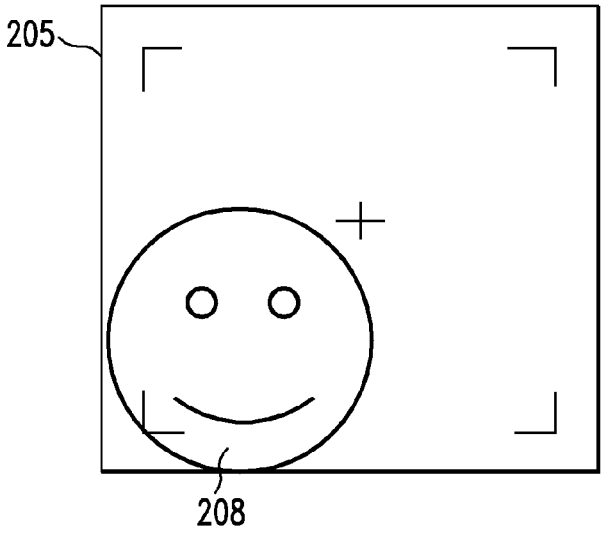


FIG. 2A

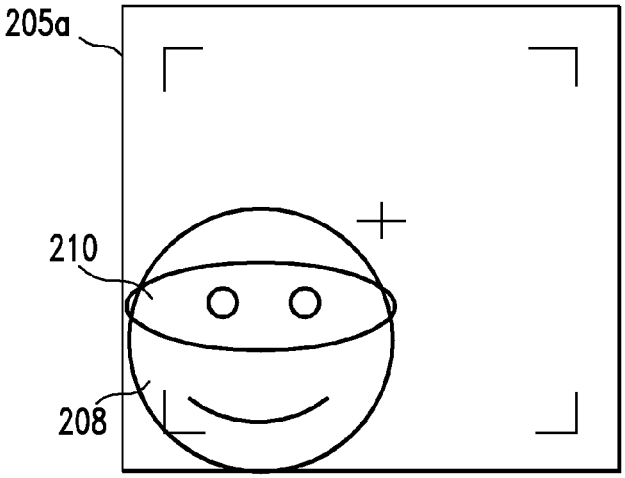


FIG. 2B

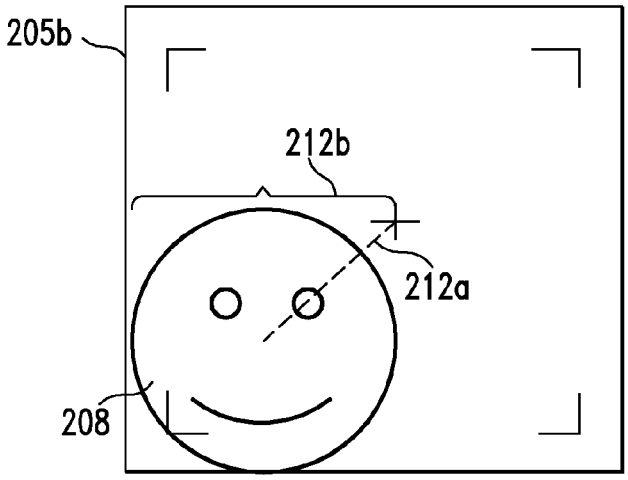


FIG. 2C

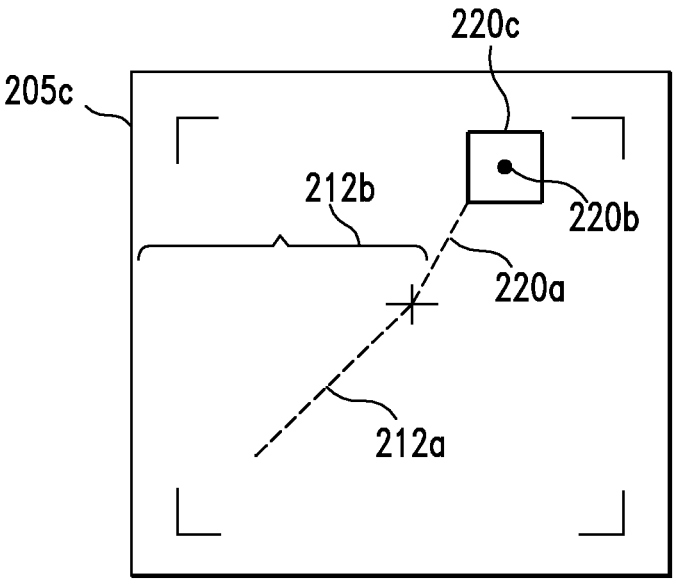


FIG. 2D

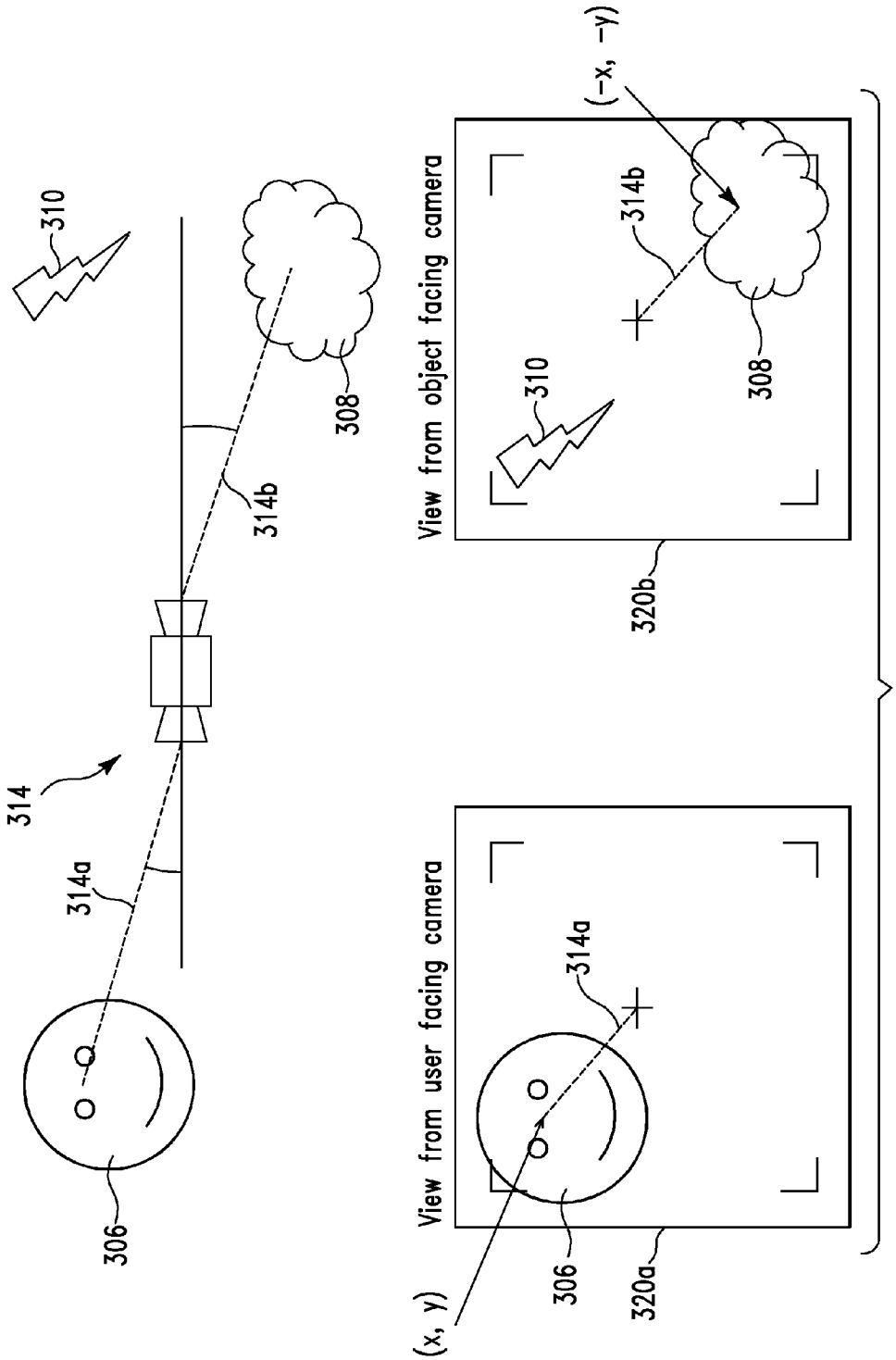

310
308
314b
314
314a
306
View from user facing camera
314a
306
320a
(x, y)
View from object facing camera
(-x, -y)
314b
310
308
320b

FIG. 3

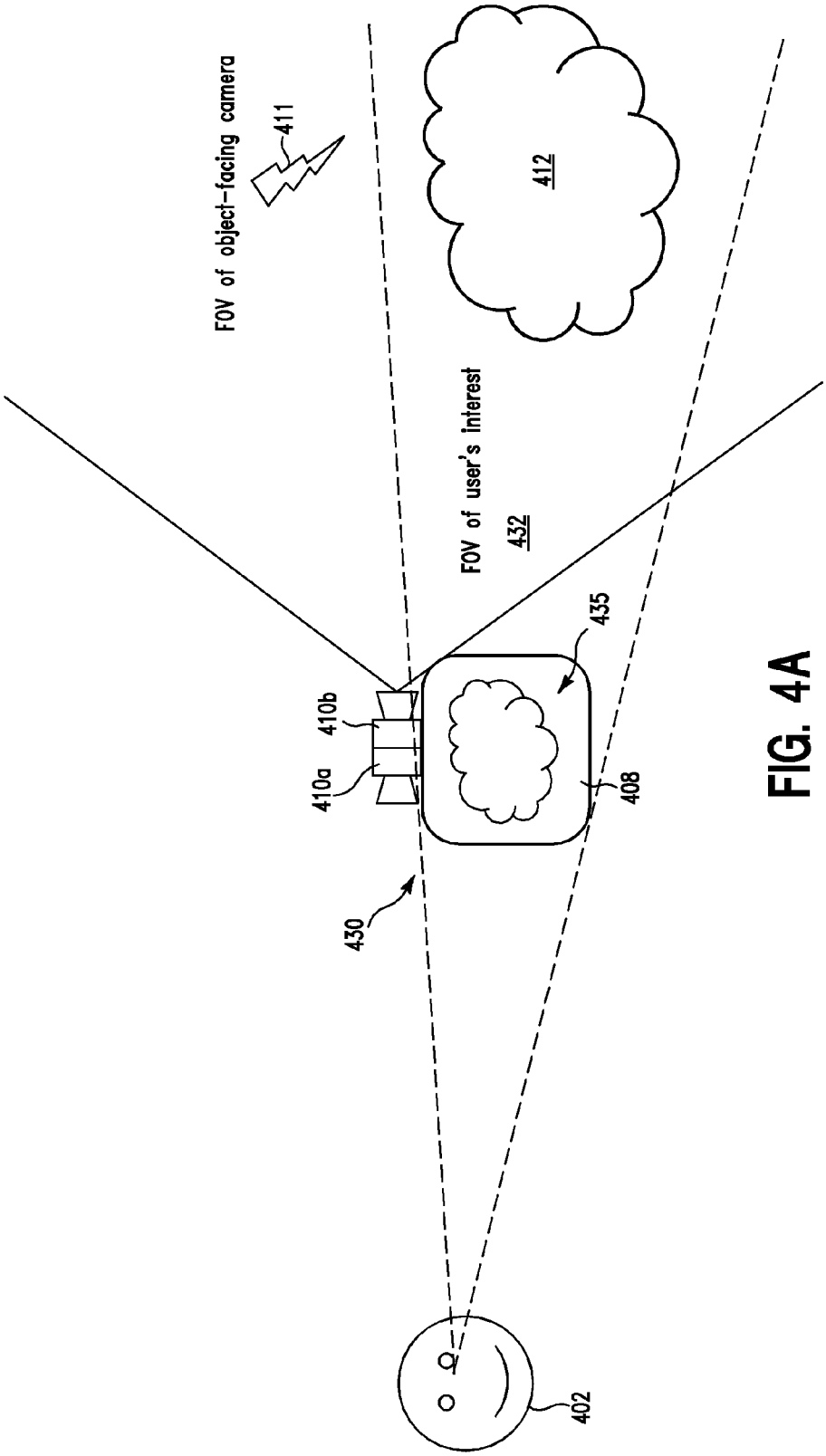

FOV of object-facing camera
411
412
FOV of user's interest
432
435
410b
410a
408
430
402

FIG. 4A

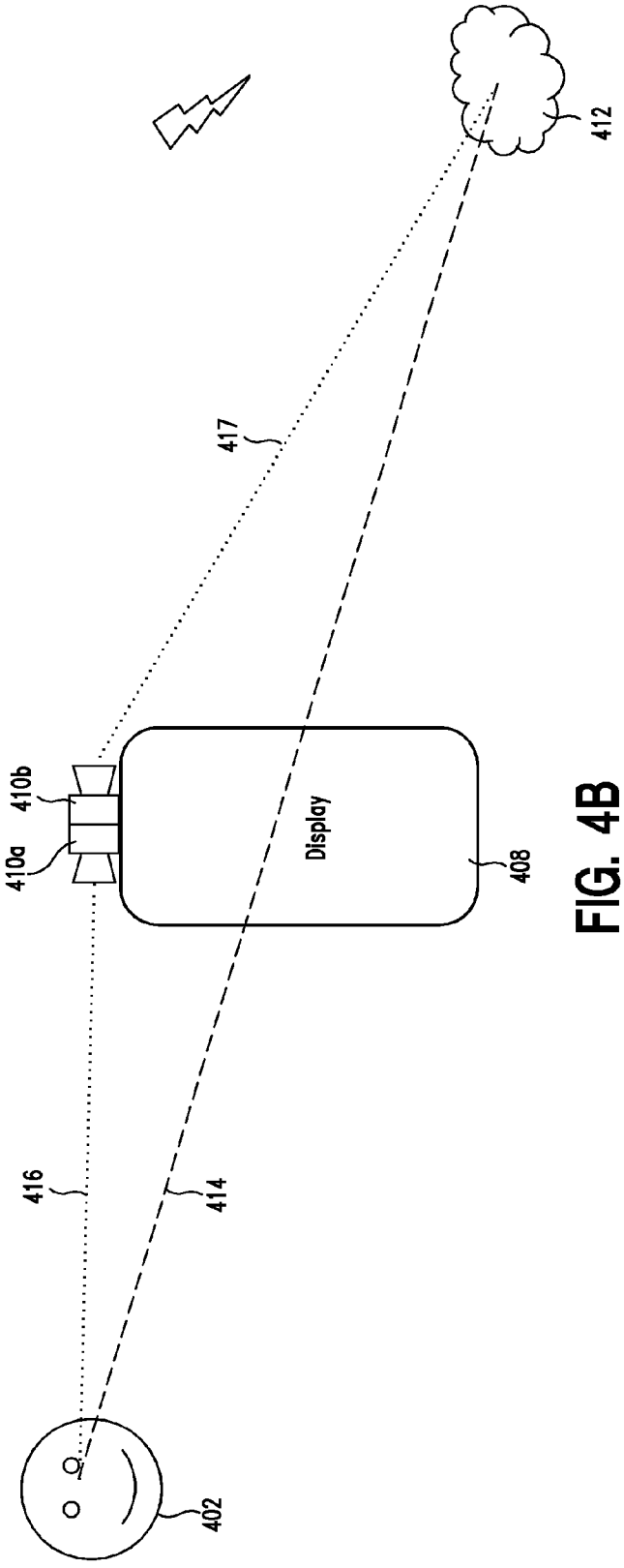


FIG. 4B

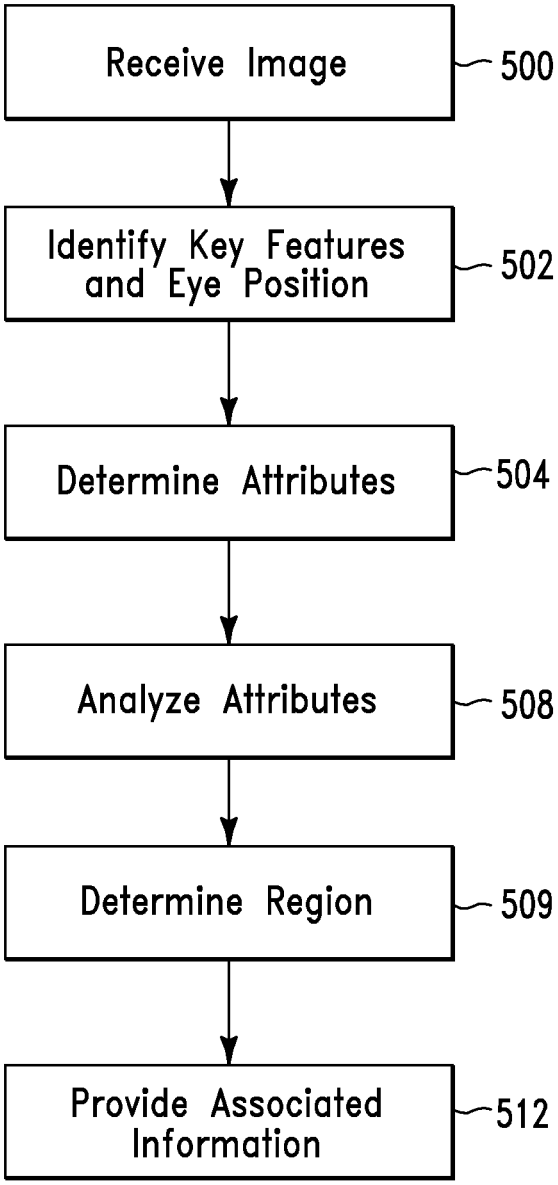

Receive Image
500
Identify Key Features and Eye Position
502
Determine Attributes
504
Analyze Attributes
508
Determine Region
509
Provide Associated Information
512

FIG. 5

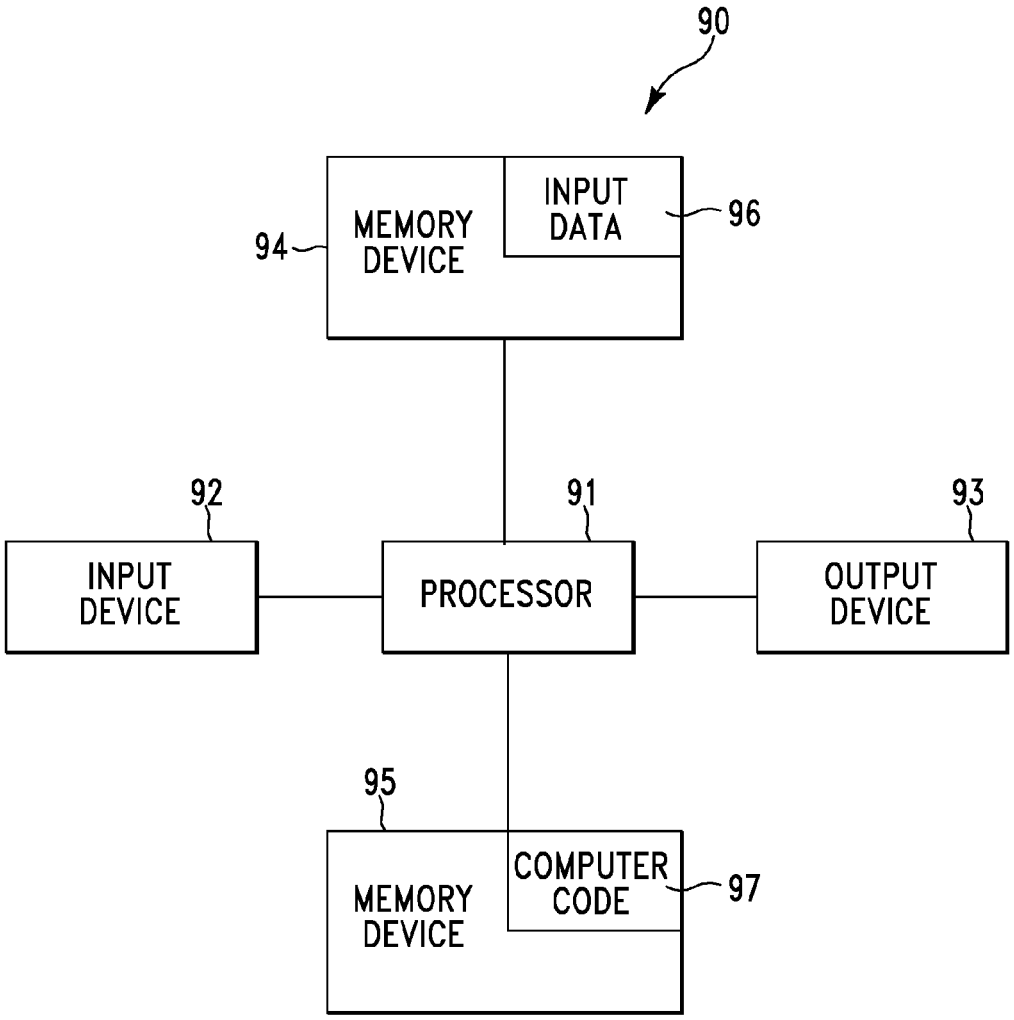

90
MEMORY DEVICE
94
INPUT DATA
96
92
91
93
INPUT DEVICE
PROCESSOR
OUTPUT DEVICE
95
MEMORY DEVICE
COMPUTER CODE
97

FIG.6

MOBILE DEVICE FIELD OF VIEW REGION DETERMINATION

FIELD

The present invention relates generally to a method determining a field of view region, and in particular to a method and associated system for determining a region within a field of view between a user and an object relative to a mobile device display apparatus.

BACKGROUND

Determining image placement location typically includes an inaccurate process with little flexibility. Managing placement of various images may include a complicated process that may be time consuming and require a large amount of resources. Accordingly, there exists a need in the art to overcome at least some of the deficiencies and limitations described herein above.

SUMMARY

A first aspect of the invention provides a method including: receiving, by a computer processor of a mobile device from a user facing camera of said mobile device, an image of a user currently using the mobile device; identifying, by the computer processor, key features of the image; determining, by the computer processor based on the key features, attributes of the key features; analyzing, by the computer processor, the attributes; determining, by the computer processor based on results of the analyzing, a specified region within a field of view of an object facing camera of the mobile device; and providing, by the computer processor for a software application, information associated with the specified region.

A second aspect of the invention provides a computer program product for field of view region determination, the computer program product including: one or more computer-readable, tangible storage devices; program instructions, stored on at least one of the one or more storage devices, to initiate receiving, from a user facing camera of the mobile device, an image of a user currently using the mobile device; program instructions, stored on at least one of the one or more storage devices, to identify key features of the image; program instructions, stored on at least one of the one or more storage devices, to determine, based on the key features, attributes of the key features; program instructions, stored on at least one of the one or more storage devices, to analyze the attributes; program instructions, stored on at least one of the one or more storage devices, to determine, based on results of the analyzing, a specified region within a field of view of an object facing camera of the mobile device; and program instructions, stored on at least one of the one or more storage devices, to initiate providing information associated with the specified region.

A third aspect of the invention provides a mobile device including a computer processor coupled to a computer-readable memory unit, the memory unit comprising instructions that when executed by the computer processor implements a method including: receiving, by the computer processor from a user facing camera of the mobile device, an image of a user currently using the mobile device; identifying, by the computer processor, key features of the image; determining, by the computer processor based on the key features, attributes of the key features; analyzing, by the computer processor, the attributes; determining, by the computer processor based on results of the analyzing, a specified region within a field of view of an object facing camera of the mobile device; and providing, by the computer processor for a software application, information associated with the specified region.

The present invention advantageously provides a simple method and associated system capable of determining image placement.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1**A illustrates a system for determining a region within a field of view between a user and an object relative to a mobile device display apparatus, in accordance with embodiments of the present invention.

FIG. **1**B illustrates an alternative view of the system the system of FIG. **1**A, in accordance with embodiments of the present invention.

FIGS. **2**A-**2**D illustrate various internal logic views of the mobile device of FIGS. **1**A and **1**B, in accordance with embodiments of the present invention.

FIG. **3** illustrates a first transformation implementation example enabled by the system of FIGS. **1**A and **1**B, in accordance with embodiments of the present invention.

FIGS. **4**A and **4**B illustrate a second transformation implementation example enabled by system **100** of FIGS. **1**A and **1**B, in accordance with embodiments of the present invention.

FIG. **5** illustrates an algorithm detailing a process flow enabled by the systems of FIG. **1**A and FIG. **1**B, in accordance with embodiments of the present invention.

FIG. **6** illustrates a computer apparatus used by the system of FIG. **1** for determining a region within a field of view between a user and an object relative to a mobile device display apparatus, in accordance with embodiments of the present invention.

DETAILED DESCRIPTION

FIG. **1**A illustrates a system **100** for determining a region within a field of view **122** between a user **118** and an area **105***a* relative to a mobile device **110** display apparatus **110***a*, in accordance with embodiments of the present invention. The above and other features of the present invention will become more distinct by a detailed description of embodiments shown in combination with attached drawings. Identical reference numbers represent the same or similar parts in the attached drawings of the invention.

As will be appreciated by one skilled in the art, aspects of the present invention can be embodied as a system, method or computer program product. Accordingly, aspects of the present invention can take the form of an entirely hardware embodiment, an entirely software embodiment (including firmware, resident software, micro-code, etc.) or an embodiment combining software and hardware aspects that can all generally be referred to herein as a "circuit," "module" or "system." Furthermore, aspects of the present invention can take the form of a computer program product embodied in one or more computer readable medium(s) having computer readable program code embodied thereon.

Any combination of one or more computer readable medium(s) can be utilized. A computer readable storage medium can be, for example, but not limited to, an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, or device, or any suitable combination of the foregoing. More specific examples (a non-exhaustive list) of the computer readable storage medium can include the following: an electrical connection having one or more wires, a portable computer diskette, a hard disk, a random access memory (RAM), a read-only memory (ROM), an erasable

programmable read-only memory (EPROM or Flash memory), an optical fiber, a portable compact disc read-only memory (CD-ROM), an optical storage device, a magnetic storage device, or any suitable combination of the foregoing. In the context of this document, a computer readable storage medium can be any tangible medium that can contain, or store a program for use by or in connection with an instruction execution system, apparatus, or device.

Computer program code for carrying out operations for aspects of the present invention can be written in any combination of one or more programming languages, including an object oriented programming language such as Java, Smalltalk, C++ or the like and conventional procedural programming languages, such as the "C" programming language or any type of programming languages such as, inter alia, an assembly language. The program code can execute entirely on the user's device, partly on the user's device, as a standalone software package, partly on the user's device.

Aspects of the present invention are described below with reference to flowchart illustrations and/or block diagrams of methods, apparatus (systems) and computer program products according to embodiments of the invention. It will be understood that each block of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart illustrations and/or block diagrams, can be implemented by computer program instructions. These computer program instructions can be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks.

These computer program instructions can also be stored in a computer readable medium that can direct a computer, other programmable data processing apparatus, or other devices to function in a particular manner, such that the instructions stored in the computer readable medium produce an article of manufacture including instructions which implement the function/act specified in the flowchart and/or block diagram block or blocks.

The computer program instructions can also be loaded onto a computer, other programmable data processing apparatus, or other devices to cause a series of operational steps to be performed on the computer, other programmable apparatus or other devices to produce a computer implemented process such that the instructions which execute on the computer or other programmable apparatus provide processes for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks.

The flowchart and block diagrams in the Figures illustrate the architecture, functionality, and operation of possible implementations of systems, methods and computer program products according to various embodiments of the present invention. In this regard, each block in the flowchart or block diagrams can represent a module, segment, or portion of code, which includes one or more executable instructions for implementing the specified logical function(s). It should also be noted that, in some alternative implementations, the functions noted in the block can occur out of the order noted in the figures. For example, two blocks shown in succession can, in fact, be executed substantially concurrently, or the blocks can sometimes be executed in the reverse order, depending upon the functionality involved. It will also be noted that each block of the block diagrams and/or flowchart illustration, and combinations of blocks in the block diagrams and/or flowchart illustration, can be implemented by special purpose hardware-based systems that perform the specified functions or acts, or combinations of special purpose hardware and computer instructions.

The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention. As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "includes" and/or "including," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

The corresponding structures, materials, acts, and equivalents of all means or step plus function elements in the claims below are intended to include any structure, material, or act for performing the function in combination with other claimed elements as specifically claimed. The description of the present invention has been presented for purposes of illustration and description, but is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the invention. The embodiment was chosen and described in order to best explain the principles of the invention and the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.

System **100** performs a process for determining a region within a field of view of an object facing camera **112***b* relative to a line of sight **122** between a user **118** and an object or area relative to a display apparatus **110***a* of a mobile device **110**. System **100** enables a generic pattern recognition process with respect to facial features via a user facing camera(s) **112***a* (e.g., recognition of relative positions of facial features including, inter alia, eyes, ears, nose, etc.) to triangulate a relative eye position in order to infer line of sight information. System **100** may determine the angle and distance of a user's eyes/face from itself via user facing camera **112***a*. The angle and distance may be used to determine an area of a scene that the user is focusing on.

System **100** includes a mobile device **110** that includes a user facing camera(s) **112***a*, an object facing camera(s) **112***b*, and software for discern a user's **118** relative eye position with respect to a display apparatus **110***a* of mobile device **110**. Mobile device **110** may include any type of mobile device including, inter alia, a cellular telephone, a PDA, a smart phone, etc. System **100** allows image selections to be made by a relative position of a display apparatus and user irrespective of an angle of the display apparatus. System **100** enables a process for determining a location of user **118** relative to a display apparatus (e.g., display apparatus **110***a*) via user facing camera **112***a*. In order to determine a location of user **118** relative to a display apparatus, mobile device **110** determines a relative distance between the user's eyes (or other size and orientation measure such as a face) and an angle between the user's eyes/face with respect to user facing camera **112***a*. The determined angle and distance are used to determine an area of a scene (i.e., to the front of user **118**) that user **118** is focusing on. User facing camera **112***a* (or cameras) is located in a known position relative to display apparatus **110***a* (or any feature) of mobile device **110** in order to discern the user's eye position and an angle relative to display apparatus **110***a* or any feature of mobile device **110**. The use of a single user facing

camera allows the user's relative position to display apparatus **110***a* (or any feature of mobile device **110**) to be determined via the determined angle and distance. The use of multiple known position user facing cameras enables a triangulation process for determining the user's relative position. The use of a single object facing camera is sufficient to determine an approximation of a line of sight **122**. The use of multiple object facing cameras enable a triangulation process with respect to areas so that an accurate line of sight **122** may be determined. The aforementioned information is used by mobile device **110** to determine a focus area of user **118**. For example, using a cellular phone, a user may focus on a specific area within an object facing camera's viewing angle by holding the phone between him/her and a desired area of focus and while moving the cellular phone closer or further from him/her, a size of the focus area may be automatically modified. The following description details an implementation example enabled by system **100** of FIG. **1**A as follows:

User **118** uses mobile device **110** (including user facing camera(s) **112***a* and object facing camera(s) **112***b*) to focuses on a first area **105***a* by holding mobile device **110** between him/her and first area **105***a*. This process may be enabled irrespective of an angle of the device. Mobile device **110** uses a relative position of the user's eyes (via angles **124** and **126**) with respect to user facing camera **112***a* to determine a section of object facing camera(s) **112***b* view to focus on. Note that offset measurements of both vertical and horizontal axis are determined.

FIG. **1**B illustrates an alternative view of system **100** for determining a region within a field of view **122** between a user **118** and an object relative to a mobile device **110** display apparatus **110***a*, in accordance with embodiments of the present invention. In contrast to FIG. **1**A, FIG. **1**B illustrates mobile device **110** (including user facing camera **112***a* and object facing camera(s) **112***b*) focusing on a second area **105***b*. Mobile device **110** (in FIG. **1**B) uses a relative position of the user's eyes (via angles **124***a* and **126***a*) with respect to user facing camera **112***a* to determine a section of object facing camera(s) **112***b* view to focus on. Note that offset measurements of both vertical and horizontal axis are determined.

FIG. **2**A illustrates an internal logic view/user image **205** of mobile device **110** of FIGS. **1**A and **1**B, in accordance with embodiments of the present invention. Internal logic view/user image **205** illustrates a retrieved image of a user **208**. Image **205** may be retrieved using a user facing camera.

FIG. **2**B illustrates an internal logic view **205***a* of mobile device **110** of FIGS. **1**A and **1**B, in accordance with embodiments of the present invention. Internal logic view **205***a* illustrates a method for identifying key features **210** of a user's face or head. The key features are used to determine a position of the user's eyes relative to a user facing camera.

FIG. **2**C illustrates an internal logic view **205***b* of mobile device **110** of FIGS. **1**A and **1**B, in accordance with embodiments of the present invention. Internal logic view **205***b* illustrates a process for identifying a user face angle, relative angle, and distance relative to a user facing camera. Internal logic view **205***b* illustrates logic for determining an origin of the user's line of sight (i.e., in 3D coordinates or a distance measured and location of the origin of the user's line of sight relative to a field of view) based on: relative angle to the user facing camera, distance, and face angle. A face angle is defined herein as an angle of the user's head relative to the user facing camera (e.g., is the user's head turned). A relative angle is defined herein as a determination of a location of the user's eyes relative to a user facing camera. A distance is defined herein as an approximate distance of the user derived from attributes of facial features that may factor in a face angle. Data **212***a* (user relative angle) and **212***b* (e.g., measurement of facial features) includes information used to determine an angle and distance of the user with respect to the user facing camera.

FIG. **2**D illustrates an internal logic view **205***c* of mobile device **110** of FIGS. **1**A and **1**B, in accordance with embodiments of the present invention. Internal logic view **205***c* illustrates a process for using information **212***a* and **212***b* (as described with respect to FIG. **2**C, supra) to identify a point **220***b* or an area **220***c* (extended from line **220***a*) in a field of view of an object facing camera. Internal logic view **205***c* includes logic for locating point **220***b* or area **220***c* within the FOV of an object facing camera. Data **212***a* or **212***b* yield an origin a line of sight in a coordinate system resulting in a calculation for point **220***b* or area **220***c*. Internal logic view **205***c* enables a transformation for:

1. Positioning of a display relative to the user facing camera.
2. Positioning of a display relative to the object facing camera.
3. Positioning of the object facing camera relative to the user facing camera.
4. Positioning of a feature of the device (e.g., a viewfinder or sight) relative to the user facing camera.

An example transformation is described as follows:

A location of the user's origin of line of sight (in x, y coordinates with an origin at the center of the user facing camera's field of view) is inputted into the logic and is transformed by a function of t( ) to yield an output as follows: t(x, y)=(−x, −y). Therefore (with respect to a co-located object and user facing cameras with identical optics oriented 180 degrees from each other), the aforementioned transformation determines a point within the FOV of the object facing camera that lies on the line made by the origin of the user's line of sight and the user facing camera. Note that the use of 2D characteristics additionally enables an accurate transformation. Additionally, various configurations of cameras or a display of a mobile device may enable transformations for determining a region within a field of view of an object facing camera. The example transformation is further described with respect to FIG. **3**, infra.

Data associated with the transformation is provided to an external software application incorporating a camera. For example:

1. An augmented reality application performing a search for information based on an image. The augmented reality application reduces a processing load by enabling a user to easily provide an object of interest. Additionally, the augmented reality application allows a process for cropping information thereby allowing the user to specify or prioritize a region for providing information.
2. A photography application for zooming/cropping a picture thereby allowing a user to understand a frame of a picture using a position of the camera device. Additionally, the photography application performs an automated zooming process.
3. A photography application for determining an object for autofocus/metering.

FIG. **3** illustrates a first transformation implementation example enabled by system **100** of FIGS. **1**A and **1**B, in accordance with embodiments of the present invention. In the example, a location of a user's **306** origin of line of sight **314***a* in x, y coordinates with an origin at the center of the user facing camera's field of view is inputted into the system. The function t(x, y) yields (−x, −y). For co-located object facing and user facing cameras with identical optics, oriented 180 degrees from each other, t( ) determines a point within the field of view of the object facing camera that lies on a line

generated by the origin of the user's line of sight and the user facing camera. View **320***a* (view from user facing camera) and view **320***b* (view from object/object facing camera) illustrates user **306** positioning mobile device **314** between him/herself and the object **308** of focus (not background object **310**). The mobile device determines the origin of the user's line of sight and applies the transformation as described, supra.

FIGS. **4**A and **4**B illustrate a second transformation implementation example enabled by system **100** of FIGS. **1**A and **1**B, in accordance with embodiments of the present invention.

FIG. **4**A illustrates a user **402** positioning a display **408** (of a mobile device) between him/herself and an object **412** of focus (not object **411**). The mobile device determines an origin of the user's line of sight and applies a similar transformation as described, supra. The transformation factors in relative positions of the display's corners **430**, a user facing camera **410***a*, an object facing camera **410***b*, and any optic differences (field of view differences) between user facing camera **410***a* and object facing camera **410***b*. An output of the aforementioned process allows the mobile device to determine a sub-area **432** of object facing camera **410***b* to display for capture or further processing. Display **408** is positioned by user **402** between him/herself and object **412**. Display **408** illustrates a cropped field of view **435**.

FIG. **4**B illustrates an input **416** and an output **417** of the process described with respect to FIG. **4**A. Line of sight **414** includes a line created by a location of a user's facial features and a point relative to a display or feature of a mobile device. An output point or area of object facing camera **410***b*, represented by output **417**, is calculated such that this point or area lies on an approximation of line of sight **414**. The aforementioned process may factor a size and position of display **408** relative to user facing camera **410***a* and object facing camera **410***b*. Additionally, optical properties of user facing camera **410***a* and object facing camera **410***b* may be factored. In this example, user facing camera **410***a* and object facing camera **410***b* are mechanically coupled.

FIG. **5** illustrates an algorithm detailing a process flow enabled by system **100** of FIG. **1**A and FIG. **1**B, in accordance with embodiments of the present invention. Each of the steps in the algorithm of FIG. **5** may be enabled and executed by a computer processor executing computer code. In step **500**, a mobile device receives an image of a user from a user facing camera of the mobile device. In step **502**, program instructions identify key features of the image. Additionally, program instructions may identify a position of the user's eyes with respect to the user facing camera based on the key features. The key features may include facial features of the user. The facial features may include eyes of the user. In step **504**, program instructions determine attributes of the key features. Determining the attributes may include, inter alia: determining an angle of the user's head with respect to the user facing camera, determining a distance of the user with respect to the user facing camera, etc. In step **508**, program instructions analyze the attributes. In step **509**, program instructions determine a specified region within a field of view of an object facing camera of the mobile device based on results of the analysis of step **508**. Determining the specified region may be further based on the position of the user's eyes with respect to the user facing camera. Determining the specified region may include: factoring a position of a display of the mobile device with respect to the user facing camera; factoring at least one position of the display with respect to the object facing camera; factoring a position of the user facing camera with respect to the object facing camera; factoring a position of a feature of the mobile device (e.g., a viewfinder of the mobile device) with respect to the user facing camera; etc. The specified region may include a point within the field of view of the object facing camera. The point may be located relative to a line formed between an origin of a line of sight of the user and a point relative to a location of the user facing camera. In step **512**, program instructions provide information associated with the specified region for a software application.

The information may be processed by the software application for, inter alia:

1. Prioritizing a display of information onto an image captured by the object facing camera.
2. Processing a range within the field of view of an object facing camera. In this instance, the software application includes an augmented reality software application.
3. Performing an automated zooming and cropping process.
4. Performing an automated autofocus and metering process.

FIG. **6** illustrates a computer apparatus **90** (e.g., mobile device **110** of FIG. **1**A and FIG. **1**B) used by system **100** of FIG. **1** for determining a region within a field of view of an object facing camera, in accordance with embodiments of the present invention. The computer system **90** includes a processor **91**, an input device **92** coupled to the processor **91**, an output device **93** coupled to the processor **91**, and memory devices **94** and **95** each coupled to the processor **91**. The input device **92** may be, inter alia, a keyboard, a mouse, a camera, a touchscreen, etc. The output device **93** may be, inter alia, a printer, a plotter, a computer screen, a magnetic tape, a removable hard disk, a floppy disk, etc. The memory devices **94** and **95** may be, inter alia, a hard disk, a floppy disk, a magnetic tape, an optical storage such as a compact disc (CD) or a digital video disc (DVD), a dynamic random access memory (DRAM), a read-only memory (ROM), etc. The memory device **95** includes a computer code **97**. The computer code **97** includes algorithms (e.g., the algorithm of FIG. **5**) for determining a region within a field of view of an object facing camera. The processor **91** executes the computer code **97**. The memory device **94** includes input data **96**. The input data **96** includes input required by the computer code **97**. The output device **93** displays output from the computer code **97**. Either or both memory devices **94** and **95** (or one or more additional memory devices not shown in FIG. **6**) may include the algorithm of FIG. **5** and may be used as a computer usable medium (or a computer readable medium or a program storage device) having a computer readable program code embodied therein and/or having other data stored therein, wherein the computer readable program code includes the computer code **97**. Generally, a computer program product (or, alternatively, an article of manufacture) of the computer system **90** may include the computer usable medium (or the program storage device).

Still yet, any of the components of the present invention could be created, integrated, hosted, maintained, deployed, managed, serviced, etc. by a service supplier who offers to determine a region within a field of view of an object facing camera. Thus the present invention discloses a process for deploying, creating, integrating, hosting, maintaining, and/or integrating computing infrastructure, including integrating computer-readable code into the computer system **90**, wherein the code in combination with the computer system **90** is capable of performing a method for determining a region within a field of view of an object facing camera. In another embodiment, the invention provides a business method that performs the process steps of the invention on a subscription, advertising, and/or fee basis. That is, a service supplier, such as a Solution Integrator, could offer to determine a region within a field of view of an object facing camera. In this case,

the service supplier can create, maintain, support, etc. a computer infrastructure that performs the process steps of the invention for one or more customers. In return, the service supplier can receive payment from the customer(s) under a subscription and/or fee agreement and/or the service supplier can receive payment from the sale of advertising content to one or more third parties.

While FIG. **6** shows the computer system **90** as a particular configuration of hardware and software, any configuration of hardware and software, as would be known to a person of ordinary skill in the art, may be utilized for the purposes stated supra in conjunction with the particular computer system **90** of FIG. **6**. For example, the memory devices **94** and **95** may be portions of a single memory device rather than separate memory devices.

While embodiments of the present invention have been described herein for purposes of illustration, many modifications and changes will become apparent to those skilled in the art. Accordingly, the appended claims are intended to encompass all such modifications and changes as fall within the true spirit and scope of this invention.

What is claimed is:

1. A method comprising:

receiving, by a computer processor of a mobile device from a user facing camera of said mobile device, an image of a user currently using said mobile device;

identifying, by said computer processor, key features of said image;

determining, by said computer processor based on said key features, attributes of said key features, wherein said determining said attributes comprises determining a first angular position of said user's head with respect to said user facing camera;

analyzing, by said computer processor, said attributes;

determining, by said computer processor based on said key features, a second angular position of said user's eyes with respect to said user facing camera;

determining, by said computer processor, an origin of a line of sight of said user;

determining, by said computer processor based on results of said analyzing, said origin, said first angular position, and said second angular position, a specified region within a field of view of an object facing camera of said mobile device, wherein said determining said specified region comprises:

factoring a position of corner portions of a display of said mobile device with respect to said user facing camera;

factoring at least one position of said display with respect to said object facing camera;

factoring a position of said user facing camera with respect to said object facing camera; and

factoring at least one position of a feature of said mobile device with respect to said user facing camera; and

providing, by said computer processor for a software application, information associated with said specified region.

2. The method of claim **1**, wherein said determining said attributes comprises:

determining a distance of said user with respect to said user facing camera.

3. The method of claim **1**, wherein said specified region comprises a point within said field of view, and wherein said point is located relative to a line formed between said origin of said line of sight of said user and a point relative to a location of said user facing camera.

4. The method of claim **1**, wherein said key features comprise facial features of said user.

5. The method of claim **4**, wherein said facial features comprise eyes of said user.

6. The method of claim **1**, wherein said feature comprises a viewfinder of said mobile device.

7. The method of claim **1**, wherein said information is processed by said software application for prioritizing a display of information onto an image captured by said object facing camera.

8. The method of claim **1**, wherein said information is processed by said software application for processing a range within the field of view of an object facing camera, wherein said range is associated with image analysis, and wherein said software application comprises an augmented reality software application.

9. The method of claim **1**, wherein said information is processed by said software application for performing an automated zooming and cropping process.

10. The method of claim **1**, wherein said information is processed by said software application for performing an automated autofocus and metering process.

11. The method of claim **1**, wherein said user facing camera comprises a plurality of user facing cameras.

12. The method of claim **1**, wherein said object facing camera comprises a plurality of object facing cameras.

13. The method of claim **1**, wherein said user facing camera and said object facing camera are comprised by at least one single wide field of view camera configured to be rotated to place said at least one single wide field of view camera in a user facing camera mode and an object facing camera mode.

14. The method of claim **1**, further comprising: providing a process for supporting computer infrastructure, said process comprising providing at least one support service for at least one of creating, integrating, hosting, maintaining, and deploying computer-readable code in the computing apparatus, wherein the code in combination with the computing apparatus is configured to perform the method of claim **1**.

15. A computer program product for field of view region determination, the computer program product comprising:

one or more computer-readable, hardware storage devices;

program instructions, stored on at least one of the one or more storage devices, to initiate receiving, from a user facing camera of said mobile device, an image of a user currently using said mobile device;

program instructions, stored on at least one of the one or more storage devices, to identify key features of said image;

program instructions, stored on at least one of the one or more storage devices, to determine, based on said key features, attributes of said key features by determining a first angular position of said user's head with respect to said user facing camera;

program instructions, stored on at least one of the one or more storage devices, to analyze said attributes;

program instructions, stored on at least one of the one or more storage devices, to determine a second angular position of said user's eyes with respect to said user facing camera;

program instructions, stored on at least one of the one or more storage devices, to determine an origin of a line of sight of said user;

program instructions, stored on at least one of the one or more storage devices, to determine, based on results of said analyzing, said origin, said first angular position, and said second angular position, a specified region

within a field of view of an object facing camera of said mobile device, wherein determining said specified region comprises:

factoring a position of corner portions of a display of said mobile device with respect to said user facing camera;

factoring at least one position of said display with respect to said object facing camera;

factoring a position of said user facing camera with respect to said object facing camera; and

factoring at least one position of a feature of said mobile device with respect to said user facing camera; and

program instructions, stored on at least one of the one or more storage devices, to initiate providing information associated with said specified region.

16. The computer program product of claim **15**, wherein said program instructions to determine attributes of said key features comprises:

program instructions, stored on at least one of the one or more storage devices, to determine a distance of said user with respect to said user facing camera.

17. The computer program product of claim **15**, wherein said specified region comprises a point within said field of view, and wherein said point is located relative to a line formed between said origin of said line of sight of said user and a point relative to a location of said user facing camera.

18. The computer program product of claim **15**, wherein said key features comprise facial features of said user.

19. The computer program product of claim **18**, wherein said facial features comprise eyes of said user.

20. A mobile device comprising a computer processor coupled to a computer-readable memory unit, said memory unit comprising instructions that when executed by the computer processor implements a method comprising:

receiving, by said computer processor from a user facing camera of said mobile device, an image of a user currently using said mobile device;

identifying, by said computer processor, key features of said image;

determining, by said computer processor based on said key features, attributes of said key features, wherein said determining said attributes comprises determining a first angular position of said user's head with respect to said user facing camera;

analyzing, by said computer processor, said attributes;

determining, by said computer processor based on said key features, a second angular position of said user's eyes with respect to said user facing camera;

determining, by said computer processor, an origin of a line of sight of said user;

determining, by said computer processor based on results of said analyzing, said origin, said first angular position, and said second angular position, a specified region within a field of view of an object facing camera of said mobile device, wherein said determining said specified region comprises:

factoring a position of corner portions of a display of said mobile device with respect to said user facing camera;

factoring at least one position of said display with respect to said object facing camera;

factoring a position of said user facing camera with respect to said object facing camera; and

factoring at least one position of a feature of said mobile device with respect to said user facing camera; and

providing, by said computer processor for a software application, information associated with said specified region.

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